QUALITY ASSURANCE ASSISTANT

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5

SECTOR – Capital Goods & Manufacturing

सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

Directorate General of Training

Skill India
कौशल भारत-कुशल भारत

QUALITY ASSURANCE ASSISTANT

(Revised in 2019)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 5

Version 1.0

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City,
Kolkata – 700 091

ACKNOWLEDGEMENT

The DGT sincerely expresses appreciation for the contribution of the Industry, State Directorate, Trade Experts and all others who contributed in revising the curriculum. Special acknowledgement to the following industries/organizations who have contributed valuable inputs in revising the curricula through their expert members:

Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Expert Group Designation
1.	Rajendra Gaikwad, Specialized Engineer R & D – HCV	Force Motor Ltd., Pune	Member
2.	B. U. Bhandari, Works Manager	TATA Motors, Pune	Member
3.	Col. U.G. Umrani, G.M.	Maruti Suzuki,	Member

CONTENTS

1. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate(ITI pass-outs) issued by Directorate General of Training (DGT) to develop skilled manpower for the industry**.** There are four categories of apprentices namely**; trade apprentice, graduate (engineers), technician (diploma) and technician (vocational) apprentices.**

Entry Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

The period of apprenticeship training for graduate (engineers), technician (diploma) and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices. It will ensure stronger collaboration between industry and the trainees which will augment supply of skilled workforce and enable development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly through various schemes.

2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

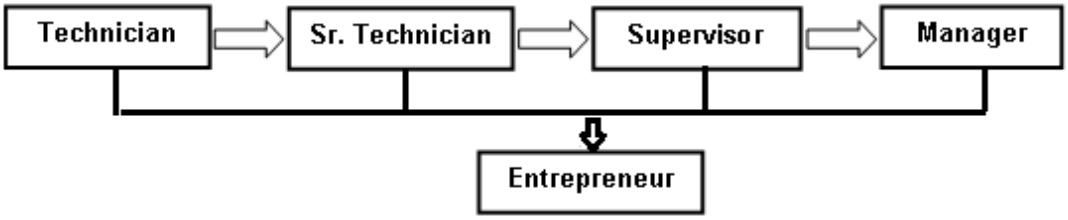
Quality Assurance Assistant trade under ATS is one of the courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Check the job/assembly as per drawing for functioning.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years (*Basic Training and On-Job Training*) :-

Total training duration details: -

Time (in months)	1-3	4-12	13-15	16-24
Basic Training	**BT– I**	**-----**	**BT – II**	**------**
Practical Training (On - job training)	**----**	**OJT – I**	**------**	**OJT – II**

A. Basic Training

For 02 yrs. Course (Engg) :-(**Total 06 months:** 03 months in 1st yr. + 03 months in 2nd yr.)

S No.	Course Element	Total Notional Training Hours (For 02 Yrs. Course)
1.	Professional Skill (Trade Practical)	550
2.	Professional Knowledge (Trade Theory)	240
3.	Workshop Calculation & Science	40
4.	Engineering Drawing	60
5.	Employability Skills	110
	Total (Including internal / formative assessment)	**1000**

B. On-Job Training:-

For 02 yrs. Course(Engg) :-(**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. Course (Engg)	1000 hrs.	3120 hrs.	4120 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by NCVT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check** individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percentage is 40% for each Theory Examination (except for Employability Skill it is 34%) and 60% marks for each Trade practical Examination. The candidate should pass in each subject conducted under All India Trade Test.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has inspected work which demonstrates attainment of an acceptable standard.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • 60 - 70% accuracy achieved while undertaking different measurement with those demanded by the component / job / set standards. • A fairly good level of neatness and consistency in the measurement • Occasional support in completing the project/work.
(b)Weightage in the range of above75% - 90% to be allotted during assessment	
For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has inspected work which demonstrates attainment of a reasonable standard.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% accuracy achieved while undertaking different measurement with those demanded by the component/job/set standards. • A good level of neatness and consistency in the measurement. • Little support in completing the project/work
(c) Weightage in the range of above 90% to be allotted during assessment	
For performance in this grade, the	• High skill levels in the use of hand tools,

candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has inspected work which demonstrates attainment of a high standard.	machine tools and workshop equipment • Above 80% accuracy achieved while undertaking different measurement with those demanded by the component / job / set standards. • A high level of neatness and consistency in the measurement. • Minimal or no support in completing the project.

3. JOB ROLE

Brief description of Job roles:

Quality Assessor should be able to carry out Quality control/Quality assurance processes, understanding product and processes required at various stages of production for meeting the expectations of final customers.

Quality Inspector-forged, casted or machined components Quality Inspector-forged, casted or machined components checks the forged, casted and machined components for both dimensional accuracy and for visual quality at various stages of manufacture, such as before production, intermediate and after production and recording the results of the inspection during and after the inspection activities.

Quality Control Inspector-Statistical process control: Quality Control Inspector-Statistical process control carries out Statistical process control by collecting different production related data and use appropriate technique to carry out statistical analysis

Reference NCO-2015:

a) 7543.0202 - Quality Assessor
b) 7543.2001 - Quality Inspector
c) 7543.3004 - Quality Control Inspector-Statistical process control

4. NSQF LEVEL COMPLIANCE

NSQF level for Quality Assurance Assistant trade under ATS: **Level 5**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

a. Process
b. professional knowledge
c. professional skill
d. core skill
e. Responsibility

The Broad Learning outcome of Quality Assurance Assistant trade under ATS mostly matches with the Level descriptor at Level- 5.

The NSQF level-5 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and Learning and some responsibility for other's works and learning.

5. GENERAL INFORMATION

Name of the Trade	Quality Assurance Assistant
NCO - 2015	7543.0202, 7543.2001, 7543.3004
Trade Code	DGT/3199
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	Two years (02 Blocks each of one year duration).
Duration of Basic Training	a) BT –I : 3 months b) BT – II : 3 months **Total duration of Basic Training: 6 months**
Duration of On-Job Training	a) OJT–I: 9 months b) OJT–II : 9 months **Total duration of Practical Training: 18 months**
Entry Qualification	Passed 10th Class under 10+2 system of education or its equivalent.
Selection of Apprenticeship	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	Degree / Diploma in Mechanical Engineering from recognized university / Institute with one year / two years experience in the relevant field respectively.
Infrastructure for Basic Training	As detailed in Annexure - I
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	01year
Related ITI trades eligible for get rebate in Quality Assurance Assistant Apprenticeship	i) Trainees completed one year BBBT in production & Manufacturing sector of CoE and ii) Trainees completed Six months in Quality Engineering module of Advance modules in production & Manufacturing sector of CoE

Note:

- *Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.*
- *For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.*

6. LEARNING OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

6.1 SPECIFIC LEARNING OUTCOME

1st Year

1. Use of metrology & inspection & dimensional control, adopt correct measuring procedure. Identify & work on system of units
2. Identify the features of precision measuring instruments e.g., vernier calliper, micrometers & slip gauge, etc. and use in measuring components
3. Identify gauging instruments and use them in checking components.
4. Check flatness, squareness and parallelism of components using measuring instruments / gauges e.g. dial test indicator, etc.
5. Interpret limits and fits. Inspect jobs on hole basis & shaft basis system, interpret tolerance, type of fit.
6. Check angle of component using proper instruments and gauges viz. bevel protector, sine bar and slip gauges, etc.
7. Check angle of gauges using balls & rollers, digital clinometers, etc.
8. Measure component using jigs and fixtures with height gauge and other instruments
9. Measure circularity and roundness using between centre and dial.
10. Measure thread (viz. flank angle, form , pitch, etc.) and Locate the errors in threads
11. Measure surface roughness as per Indian Standard evaluating parameters

2nd Year

1. Measure components on Mechanical, Optical, pneumatic and electronic Comparators
2. Measure dimensions of component with the help of microscope
3. Calibrate measuring instruments & prepare calibration charts
4. Check components with Non Destructive and Magnetic Particle test.
5. Check mechanical properties of metal e.g. Hardness, strength, etc.
6. Use SQC & apply it in workshop.
7. Perform acceptance sampling
8. Study inspection level
9. Use TQM, TQC & TPM.
10. Explain Importance of ISO 9000 & QS 9000
11. Explain Importance of ISO 14000.

6.2 GENERIC LEARNING OUTCOME

Year I & II:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand; explain different mathematical calculation & science in the field of study apply in day to day work. *[Different mathematical calculation & science - Conversion of Units, Percentage, & Mensuration - Area & Volume of different surfaces and solids, and Properties of materials, Ferrous & non-ferrous metals, Mass, weight, Density, etc.]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical figures like Triangles, Square, Rectangle, Rhombus, Parallelogram, Circle etc., Freehand sketching of Hand tools used for Quality Assurance Assistant]*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

SPECIFIC OUTCOME	
LEARNING OUTCOME	**ASSESSMENT CRITERIA**
1st Year 1. Use of metrology & inspection & dimensional control, adopt correct measuring procedure. Identify & work on system of units 2. Identify the features of precision measuring instruments e.g., vernier calliper, micrometers & slip gauge, etc. and use in measuring components 3. Identify gauging instruments and use them in checking components. 4. Check flatness, squareness and parallelism of components using measuring instruments / gauges e.g. dial test indicator, etc. 5. Interpret limits and fits. Inspect jobs on hole basis & shaft basis system, interpret tolerance, type of fit. 6. Check angle of component using proper instruments and gauges viz. bevel protector, sine bar and slip gauges, etc. 7. Check angle of gauges using balls & rollers, digital clinometers, etc. 8. Measure component using jigs and fixtures with height gauge and other instruments 9. Measure circularity and roundness using between centre and dial. 10. Measure thread (viz. flank angle, form , pitch, etc.) and Locate the errors in threads 11. Measure surface roughness as per Indian Standard evaluating parameters **2nd Year** 12. Measure components on Mechanical, Optical, pneumatic and electronic Comparators 13. Measure dimensions of component with	*Assessment Criteria for each specific learning outcome mentioned in 1st Year & 2nd Year ensures the trainee achieves well developed skill with clear choice of procedure in familiar context.* *Assessment criteria should broadly cover the aspect of –* ***Planning** (Identify, ascertain, select etc.); **Execution** (check, measure, test etc). by applying –* *1) a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information* *2) Knowledge of facts, principles, processes, and general concepts, in the field of work or study 3)Desired Mathematical Skills and some skill of collecting and organizing information, communication) and* ***Checking / Testing** to ensure functionality during the assessment of each outcome.* *The assessments parameters also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.*

the help of microscope 14. Calibrate measuring instruments & prepare calibration charts 15. Check components with Non Destructive and Magnetic Particle test. 16. Check mechanical properties of metal e.g. Hardness, strength, etc. 17. Use SQC & apply it in workshop. 18. Perform acceptance sampling 19. Study inspection level 20. Use TQM, TQC & TPM. 21. Explain Importance of ISO 9000 & QS 9000 22. Explain Importance of ISO 14000.	

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	**ASSESSMENT CRITERIA**
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1.2 Recognize and report all unsafe situations according to site policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1.4 Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1.5 Identify and observe site policies and procedures in regard to illness or accident.
	1.6 Identify safety alarms accurately.
	1.7 Report supervisor/ Competent authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1.8 Identify and observe site evacuation procedures according to site policy.
	1.9 Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1.10 Identify basic first aid and use them under different circumstances.
	1.11 Identify different fire extinguisher and use the same as per requirement.
	1.12 Identify environmental pollution & contribute to avoidance of same.

	1.13	Take opportunities to use energy and materials in an environmentally friendly manner
	1.14	Avoid waste and dispose waste as per procedure
	1.15	Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science in the field of study. Apply in day to day work.*[Different mathematical calculation & science - Conversion of Units, Percentage, & Mensuration - Area & Volume of different surfaces and solids, and Properties of materials, Ferrous & non-ferrous metals, Mass, weight , Density, etc.]*	2.1	Explain concept of basic science related to the field such as Material science - Properties of materials, Ferrous & non-ferrous metals, etc.
	2.2	Mass, weight, Density, etc.
	2.3	Use scale/ tapes to measure as per specification.
	2.4	Calculate area / volume of the materials.
	2.5	Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6	Ensure dimensional accuracy of assembly by using different instruments/gauges.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-. Geometrical figures like Triangles, Square, Rectangle, Rhombus, Parallelogram, Circle etc., Freehand sketching of Hand tools used for Quality Assurance Assistant]*	3.1	Read & interpret the information on drawings and apply in executing practical work.
	3.2	Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3.3	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1	Select appropriate measuring instruments such as Vernier callipers, Micrometers, Height gauges, and Bevel Protractor etc. (as per tool list).
	4.2	Ascertain the functionality & correctness of the instrument.
	4.3	Measure dimension of the components & record data to analyse with the given drawing/measurement.

5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7.1 Explain personnel finance and entrepreneurship.
	7.2 Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7.3 Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8.1 Use documents, drawings and recognize hazards in the work site.
	8.2 Plan workplace/ assembly location with due consideration to operational stipulation
	8.3 Communicate effectively with others and plan project tasks
	8.4 Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.

8. SYLLABUS

BASIC TRAINING (BT – I) **Duration: (03) Three Months**		
Week No.	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
01 - 02	Physical introduction to measuring instruments – Handle instruments -exercises in the Use Linear measuring instruments such as Steel rule of different ranges. Outside calipers, inside calipers for measuring inside, outside parameters. Vernier calipers - Least count, exercise in outside measurement, inside measurement s, depth gauge.	Introduction to Metrology, Objectives of Metrology - measurements - principles - methods of measurement. Terminology used in Metrology - Accuracy - Repeatability - Resolution etc. SI units of measurements - physical quantities under SI system
03-04	Measure flat rectangular objects , cylindrical objects, hollow components, threaded components Practice external & internal measurements using Micrometers and Height gauges	Selection of measuring instruments, care, use and maintenance of measuring instruments - Handling of precision instruments - Vernier Caliper, Micrometer, Height Gauge, Dial Gauge (Plunger and bevel type) with stand (0.01 mm Resolution), checking squareness using combination set.
05-06	Exercises on measurements using digital caliper- Dial type caliper- External Micrometer covering outside measurements, Internal measurement Inside micrometer, depth Vernier caliper, Measurement of wall thickness of tubes etc., Exercises on use of Height gauge (including digital), Depth Vernier Caliper, tube Micrometer, plunger dial gauges, lever dial gauges, bore dial gauges, Micrometer (3 leg) and Internal Micrometer (stick type), V-Block, Angle Plate, Straight edge, Bevel Protractor and combination set. Exercises on the use of feeler gauge, screw pitch gage Radius gauge.	Classification of measurements-Length measuring, Line Standards and End Standards Limits, fits, tolerances- need for tolerance, grades, types, terminologies as per IS 919-1993, types of fits, classification of fits, shaft basis systems, hole basis systems, applications and selection. Digital caliper- Digital height gauge- depth Vernier Caliper, Dial Gauge (Plunger and Lever Dial), Bore Dial Gauge, depth Micrometer, Tube Micrometer), V-Block, Angle Plate, Straight edge, Bevel Protractor and combination set.

07-08	Exercises on Slip Gauges with accessories for taking inside, outside, depth, height Measurement, marking and selection of slip gauge sets, material and grades as per IS 2964 Exercises on reading of errors-errors due to dirt-due to temperature changes-parallax errors, sine error and cosine error Exercises on Angle measurements by using Bevel Protractor, Combination set, balls & rollers, Sine bar and Digital Clino Meter Exercises on making a gauge dimension for a component as per IS 3455 checking of Limit plug gauge, Adjustable snap gage - GO and NO GO gages and Ring Gauges	Gauge Blocks -accessories, Types, Materials, Care, use, maintenance, Selection of Slip Gauges Sources of error-static error-environmental, error-characteristic of errors-Systematic error and its causes-Random error and its causes Angle measurements, Angle Gauge blocks, Bevel Protractor, Sine bar, Combination set, Digital Clino Meter Care, Use, Maintenance of Surface plate-Granite surface Plate-Cast Iron Surface Plate-Grades (Flatness Measurement) of surface plate Gauging practice as per IS 3455 for making a dimension for GO and NOGO gauge to a component - Plane gauge-Radius gauges, Feeler gauge, Taper, wire and thickness gauges
09-10	Exercises on all the Geometrical Features as per IS: 8000-Roundness, cylindricity, Straightness, Flatness, Profile of a line, Profile of a surface, perpendicularity, parallelism, angularity, concentricity, symmetry, position, radial run out, axes run out, maximum material condition and least material condition. Use of V-blocks, between centers using dials - Exercise to interpret drawings as per IS : 8000, Flatness using sprit-level Profile projector-measurement of profile by comparison, measurement by individual parameters - Length, width, diameter, angle, radius, etc., with a help of data processor - Manual method and Surface illumination Thread measurement by using Profile Projector and Thread Pitch Micrometer.	Use of Fixtures for measurement, use of Angle plates for measurement-concentricity checking attachment-T-slotted sine table- -Sine vice-use of V-Blocks and Straight edges Geometrical Features IS: 8000-Roundness, cylindricity, Straightness, Flatness, Profile of a line, Profile of a surface, perpendicularity, paralism, angularity, concentricity, symmetry, position, radial run out, axial run out, maximum material condition and least material condition Use of sprit level, radius gauge and straight edge etc Profile measurements-profile projector, principles, and applications. Metrology of screw thread-terminologies, measurement of thread by using profile projector and thread pitch comparator
11-12	Exercises on the use of jigs and fixtures and measurement on a surface plate using height gauge and other instruments,	Use of portable surface measuring instrument and use of its related software. Surface Roughness measurements-Introduction terminologies as per Indian

	Surface roughness by using Portable Surface Roughness Measurement measure the surface finish in outside, inside inclined etc. in the components made by different machines like turning, grinding, shaper and milling machines etc.	Standard evaluating parameters like Ra, Ry, Rz etc. Lays - Types, symbols and its usage
13	**Assessment/Examination (03days)**	

Note: - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related operations may be shown to the trainees to give a feel of Industry and their future assignment.*

BASIC TRAINING (BT – II) **Duration: (03) Three Months**		
Week No.	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
1 - 2	Exercises on Mechanical, Optical, pneumatic and electronic Comparators Exercises on checking/inspection of gauges and components by using video inspection system for measuring length, width, height, diameter, radius, distance between 2holes Distance between circle and a line, etc. Exercises on 2D micro height for checking height, hole diameter, distance between 2 holes, etc.	Comparators-types-Mechanical, Optical, pneumatic and electronic comparator -principles, advantages and Disadvantages of various types of comparators and digital multi dimensional comparator Principle , construction of video inspection system and 2 D mirco height
3 - 4	Exercises on Calibration of Vernier Calipers Range 0 -150, 0-300 External and Internal Micrometers, Lever dial gauge and plunger dial Gauges, Height Gauges, Bevel Protractor, Bore dial gauges, Depth Micrometer, Depth Vernier Caliper, 2D micro height, Video inspection system	Calibration-What, Why, When, Where, and How to do the calibration Calibration of Vernier Caliper, Micrometer, Dial and Height Gauges, and Bevel Protractor Environmental conditions for calibration laboratories as per IS: 196 and National Accreditation board for testing and calibration labs (NABL)
5	Non Destructive test :- Perform Dye penetrant test on the given specimen using Red dye and fluorescent dye. Perform Magnetic Particle test on the given specimen using Electromagnetic principles: Headshot techniques, Coil shot techniques, Central conductor techniques.	Principles and operating procedure of Dye Penetrant Inspection, Advantages and limitations. Applications, Consumables used in this method. Principles and operating procedure of Magnetic particle inspection, Advantages and limitations, Applications, Types of magnetization techniques. Consumables used in this method.
6	Perform hardness test on a given material with:- Rockwell hardness test, Brinell hardness test and Vickers hardness test. Perform mechanical testing of metals viz. tensile test, Bend test, impact test, etc. and calculate the properties of material as per standard procedure	Hardness test: Rockwell hardness test, Brinell hardness test, Vickers hardness test. Mechanical Testing of Metals: Tensile test, Bend test, Impact test.

7 - 8	Take a case study-collection of data, making histogram, normal curve, bi modal, and skewed variation curve by manual method. Calculation of mean, mode, range and standard deviation Feed the result in SPC software and find the variation. Take a care study and preparing control charts like X chart, R chart, p chart, np Chart, c chart, and u chart Calculation of Cp, Cpk, and Cr by manual method and by using computer	Statistical Process control-objective, introduction to variation, measurement of variation-histogram, pattern of variation-normal, by model, skewed pattern Measurement of variation-mean, mode, range, standard deviation, 68%, 95% and 99.7% rule for normal curve. Control Charts object - what are control charts, details of control charts i.e., information section, data section, graph section and comments section, selection of charts, parato analysis Interpretation of control charts-types of control charts, variable control charts like X bar and R chart Attribute control charts like P chart, np chart, C chart and U chart Process capability-What is process capability, measurements, types, Cr, Cp and Cpk.
9 - 10	Video demonstration on CMM (co-ordinate measuring machine), includes selection, types, uses of CMM types of probes, types of air bearings, details of software, including geometrical features, curve measurements and gear measurements. Video demonstration on Calibration Equipments like dial gauge calibrator, caliper checker, length measuring machine Video demonstration on instruments, geometrical features, surface finish, geometrical dimensioning and tolerances	Awareness of quality management system - Terms used in ISO Quality System Standards and Explanation - Industries specific standards
11-12	Exercises on Case study Exercises on Mistake Proofing Exercises on use of QC 7 tools Exercises on MSA	Problem solving methodology - Concept of mistake proofing QC7 tools - Introduction to MSA (Measuring System Analysis)
13	**Assessment/Examination (03 days)**	

Note - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related operations may be shown to the trainees to give a feel of Industry and their future assignment.*

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Basic Training – I		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	**Unit**: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	**Engineering Drawing: Introduction and its importance** - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003
2.	**Fractions**: Fractions, Decimal fraction, Addition, Subtraction, Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Calculator.	**Drawing Instruments : their uses** Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.
3.	**Properties of Material** : properties - Physical & Mechanical, Types –Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous Alloys.	**Lines :** - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line Methods of Division of line segment
4.	**Average :**Problems of Average. **Ratio &Proportion** : Simple calculation on related problems.	**Drawing of Geometrical Figures:** Drawing practice on: - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.
5.	**Mass, Weight and Density**: Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density.	**Dimensioning:** - Definition, types and methods of dimensioning (functional, non-functional and auxiliary) - Types of arrowhead - Leader Line with text

6.	**Percentage**: Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	**Free hand drawing of** - Lines, polygons, ellipse, etc. - geometrical figures and blocks with dimension - Transferring measurement from the given object to the free hand sketches.
7.	- Forces definition. - Definition and example of compressive, tensile, shear forces, axial and tangential forces. Stress, strain, ultimate strength, factor of safety for MS. **Speed and Velocity**: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation.	**Method of presentation of Engineering Drawing** - Pictorial View - Orthogonal View - Isometric view
8.	**Mensuration:** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle. Volume of solids – cube, cuboids, cylinder and Sphere. Surface area of solids – cube, cuboids, cylinder and Sphere. - Area of cut-out regular surfaces: circle and segment and sector of circle. - Volume of cut-out solids: hollow cylinders, frustum of cone, block section. - Volume of simple solid blocks.	**Symbolic Representation (as per BIS SP:46-2003) of :** - Fastener (Rivets, Bolts and Nuts) - Bars and profile sections - Weld, brazed and soldered joints. - Electrical and electronics element - Piping joints and fittings
9.	**Algebra** : Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables). - Circular Motion: Relation between circular motion and Linear motion, Centrifugal force, Centripetal force.	**Dimensioning practice:** - Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) - Symbols preceding the value of dimension and dimensional tolerance.
10.	**Work, Power and Energy**: work, unit of work, power, unit of power, Horse power, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.	**Construction of Geometrical Drawing Figures:** - Polygons and their values of included angles. Conic Sections (Ellipse)
11.		**Projections:** - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference)

		- Symbol of 1st angle and 3rd angle projection as per IS specification. Drawing of Orthographic projection from isometric/3D view of blocks

Basic Training – II		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	**Trigonometry:** Trigonometric ratios, Trigonometric tables. - Finding the value of unknown sides and angles of a triangle by Trigonometrical method. - Finding height and distance by trigonometry.	- Machined components; concept of fillet & chamfer; surface finish symbols.
2.	**Friction** and its application in Workshop practice.	- Screw thread, their standard forms as per BIS, external and internal thread, conventions on the features for drawing as per BIS.
3.	**Heat & Temperature**: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation.	- Reading & interpretation of assembly drawing and detailing.
4.	**Basic Electricity**: Introduction, use of electricity, Types of current_ AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections – series, parallel, electric power, Horse power, energy, unit of electrical energy. Concept of earthing.	- Reading of drawing. Simple exercises related to missing lines, dimensions and views. How to make queries.
5.	**Heat treatment** – Necessity, different common types of Heat treatment.	- Simple exercises related to trade related symbols. - Solution of NCVT test papers.
6.	**Graph:** - Read images, graphs, diagrams	

	– bar chart, pie chart. - Graphs: abscissa and ordinates, graphs of straight line, related to two sets of varying quantities.	
7.	**Transmission of power:** By belt, pulleys & gear drive.	
8.	**Concept of pressure** – units of pressure, atmospheric pressure, gauge pressure – gauges used for measuring pressure. **Introduction to pneumatics & hydraulics systems.** Solution of NCVT test papers	

9.2 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS.)

Basic Training – I (Duration – 55 hrs.)	
1. English Literacy Duration : 20 Hrs. Marks : 09	
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking / Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. I.T. Literacy Duration : 20 Hrs. Marks : 09	
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals,

	Switching on-Starting and shutting down of computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.
Word processing and Worksheet	Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills Duration : 15 Hrs.	Marks : 07
Introduction to Communication Skills	Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.
Motivational Training	Characteristics Essential to Achieving Success. The Power of Positive Attitude. Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself

	Personal Goal setting and Employability Planning.
Facing Interviews	Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview.
Behavioral Skills	Problem Solving Confidence Building Attitude
Basic Training – II Duration – 55 hrs.	
4. Entrepreneurship Skills Duration : 15 Hrs. Marks : 06	
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.
Institutions Support	Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.
5. Productivity Duration : 10 Hrs. Marks : 05	
Benefits	Personal / Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How improves or slows down.
Comparison with developed countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.

Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.
6. Occupational Safety, Health and Environment Education Duration : 15 Hrs. Marks : 06	
Safety & Health	Introduction to Occupational Safety and Health importance of safety and health at workplace.
Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.
Accident & safety	Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.
First Aid	Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. safety, health, welfare under legislative of India.
Ecosystem	Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of Energy, re-use and recycle.
Global warming	Global warming, climate change and Ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and Harvesting of water.
Environment	Right attitude towards environment, Maintenance of in -house environment.
7. Labour Welfare Legislation Duration : 05 Hrs. Marks : 03	
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act,

	Employees Provident Fund Act, The Workmen's compensation Act.
8. Quality Tools 10 Hrs.	Duration : Marks : 05
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of House-keeping, Practice of good Housekeeping.
Quality Tools	Basic quality tools with a few examples.

10. DETAILS OF COMPETENCIES (ON-JOBTRAINING)

The **competencies** on completion of On-Job Training are detailed below: -

OJT – I

1. Use of metrology & inspection & dimensional control, adopt correct measuring procedure. Identify & work on system of units
2. Use of measuring & gauging instruments.
3. Identify the features of precision measuring instruments
4. Use of precision measuring instruments e.g., vernier calliper, micrometers & slip gauge for measurement
5. Use of dial test indicator
6. Use of measuring instruments / gauges to measure flatness, squareness and parallelism of components.
7. Use of limits and fits. To interpret the tolerance.
8. Inspect jobs on hole basis & shaft basis system, to interpret the type of fit.
9. Selection of proper instruments for checking dimension and tolerances of a component.
10. Use of angle slip gauges.
11. Use of bevel protector
12. Check angle of tapered component with a sine bar
13. Use of balls & rollers for measuring angle of 'V' groove, measuring angle of a taper plug gauge, measuring taper of a ring gauge checking a dovetail slide.
14. Use of tailors principles of gauge design
15. Use of different types gauges to check different types of jobs.
16. Use jigs and fixtures to measure a job using height gauge and other instruments
17. Measure circularity and roundness using between centre and dial.
18. Identify elements of a thread
19. Locate the errors in threads
20. Measurement of thread
21. Measure flank angle, form & pitch with the help of profile projector
22. Measure surface roughness- IS 3073,
23. Inspect Surface with the help of optical fiat.
24. Identify Surface roughness symbols.
25. Measure surface finish by talysurf surface measuring instrument.
26. Check the surface monochromatic.

OJT – II

1. Measure components on Mechanical, Optical, pneumatic and electronic Comparators
2. Measure with the help of microscope

3. Calibrate measuring instruments & prepare calibration charts.
4. Check components with Non Destructive test - Perform Dye penetrant test on the given specimen
5. Perform Magnetic Particle test on the given specimen
6. Check Hardness of metal
7. Check mechanical properties of metal e.g. tensile test, Bend test, impact test, etc.
8. Study Statistical Process control
9. Use SQC & apply it in workshop.
10. Perform acceptance sampling
11. Study inspection level
12. Use TQM, TQC & TPM.
13. Explain Importance of ISO 9000 & QS 9000
14. Explain Importance of ISO 14000

Note:

1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.
2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

QUALITY ASSURANCE ASSISTANT			
LIST OF TOOLS AND EQUIPMENT for Basic Training			
A. MEASURING INSTRUMENT			
Sl. no.	**Name of the Tool & Equipments**	**Specifications**	**Quantity (Nos.)**
1.	Vernier Caliper	0-150 mm (L.C. 0.02 mm)	16
2.	External Micrometer	0-25 mm (L.C. 0.01 mm)	16
3.	Plunger Dial	Gauge 0 -10 mm (L.C. 0.01mm)	16
4.	Dial Gauge Stands		16
5.	Height Gauge with adjustable scale	0 - 300 mm (L.C. 0.02 mm)	8
6.	Digital Caliper with SPC provision	0-150 mm (L.C. 0.01 mm)	6
7.	External Micrometer	25-50, 50-75mm (L.C. 0.01 mm)	4
8.	Digital Micrometer with SPC	0-25 mm	6
9.	Micrometer stands		8
10.	Tube end Micrometer, Blade Micrometer, Flange Micrometer		1 Each
11.	Pitch Micrometer with 6 sets of Anvil (Metric)		1
12.	Internal Micrometer 3 point	(15 to 20mm)	1
13.	Stick micrometer	(35 to 150mm)	1
14.	Dial vernier caliper	0 to 150mm, (L.C 0.05mm)	1
15.	Depth Vernier 1 set		1
16.	Plunger Dial Gauge	0 -1 mm (L.C. 0.001 mm)	6
17.	Lever Dial Gauge	0 - 1 mm (L.C. 0.002 mm)	2
18.	Bore Dial Gauge	10 - 50 mm (L.C 0.01 mm)	2
19.	Digital Height Gauge	0-300 mm (L.C. 0.01 mm)	1
20.	Slip Gauge	(Tungsten Carbide Grade I, 122Nos)	2sets
21.	Slip Gauge Accessories		1
22.	Caliper Checker	0-300 mm	4
23.	2D Micro Height	0-300 mm	2
24.	Profile Projector (Vertical Type)	300 mm diameter with 10x, 20x magnification with Data Processor	1
25.	Feeler Gauge set, Screw pitch gauge ,		Each 2
26.	Snap Gauge, Adjustable Snap Gauge, Ring gauge, plug gauge, etc.		

27.	Bevel Protractor	(L.C. 5 Min)	4 set
28.	Sine Bar	100 mm	4
29.	Combination Set		4 set
30.	Digital clino Meter		1
31.	Spirit Level	0-200 mm Sensitivity 0.02 mm/Meter (Block type)	4
32.	SPC training software		1
33.	SPC software with provisions for online data capturing		1
34.	SPC Cable for all instrument, Interface Box		6
35.	Computers with Furniture suitable to the SPC software for exercise		4
36.	Machined Samples with Nickel coated (100 Nos.) , for different parameter suitable for SPC and Instrument Practice (6 models)		1
37.	Air gage suitable for above 100 nos. of machined samples		1
38.	Optical flat	50 mm Diameter	1
39.	Optical Parallel	0-25 mm for Micrometer	1
40.	Portable Surface Roughness Measuring Instruments with PC cable and software		1
41.	Mechanical Comparator		1
42.	Electronic Comparator		1
43.	Dial Gauge Calibrator	0 - 25mm	1
44.	Video Inspection system CCD(Charge Coupled Device), Colour camera, Colour Monitor, light source and stand		1
45.	Educational Video CD on CMM, Roundness and latest equipments and instruments		1set
46.	Slip gauge set (Tungsten carbide 5Nos, Ceramic 5Nos, Steel alloys 5Nos) any size		1set
47.	Air compressor suitable for Air gauge		1 No
48.	Rockwell Hardness Testing machine with standard set of accessories		1 no.
49.	Brinell Hardness Testing machine with standard set of accessories		1 no.
50.	Vickers Hardness Testing machine with standard set of accessories		1 no.
51.	Non-Destructive Testing machines (different types)		01 No. each

B. GENERAL SHOP OUTFIT			
52.	Granite Surface Plate with Stand and fine adjustment with between centre attachment	1000 x 630 mm	4
53.	'V' - Block -	100x75x150 mm	6
54.	Vacuum cleaner		1
55.	Fire extinguisher equipment and first aid box. Etc.		1 set
E. WORKSHOP FURNITURE			
56.	Suitable Work Tables		As required
57.	Stools		17
58.	Trainees locker		2
59.	Firefighting equipment, first aid box etc		As required
60.	Book shelf (glass panel)		1
61.	Storage Rack		As required
62.	Storage shelf		As required

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: QUALITY ASSURANCE ASSISTANT

LIST OF TOOLS& EQUIPMENTS FOR -16 APPRENTICES

1) Space Norms : 45 Sq.m.(For Engineering Drawing)

2) Infrastructure:

A : TRAINEES TOOL KIT:-			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1.	Draughtsman drawing instrument box		17
2.	Set square celluloid 45^o	(250 X 1.5 mm)	17
3.	Set square celluloid 30^o-60^o	(250 X 1.5 mm)	17
4.	Mini drafter		17
5.	Drawing board IS: 1444	(700mm x500 mm)	17
B : Furniture Required			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1	Drawing Board		16
2	Models : Solid & cut section		as required
3	Drawing Table for trainees		as required
4	Stool for trainees		as required
5	Cupboard (big)		01
6	White Board	(size: 8ft. x 4ft.)	01
7	Trainer's Table		01
8	Trainer's Chair		01

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	08 Nos.
2.	UPS - 500VA	08 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	08 Nos.
5.	Computer Chairs	16 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.		

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :			**Year of Enrollment :**
Name & Address of ITI (Govt./Pvt.) :			**Date of Assessment :**
Name & Address of the Industry :			**Assessment location: Industry / ITI**
Trade Name :	**Examination:**		**Duration of the Trade/course:**
Learning Outcome:			

Sl. No	**Candidate Name**	**Father's/Mother's Name**	Safety consciousness (15)	Workplace hygiene (5)	Attendance/ Punctuality (10)	Ability to follow Manuals/ Written instructions (5)	Application of Knowledge (10)	Skills to handle tools & equipment (10)	Economical use of materials (5)	Speed in doing work (10)	Quality in workmanship (15)	VIVA (15)	**Total internal assessment Marks**	**Result (Y/N)**
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														